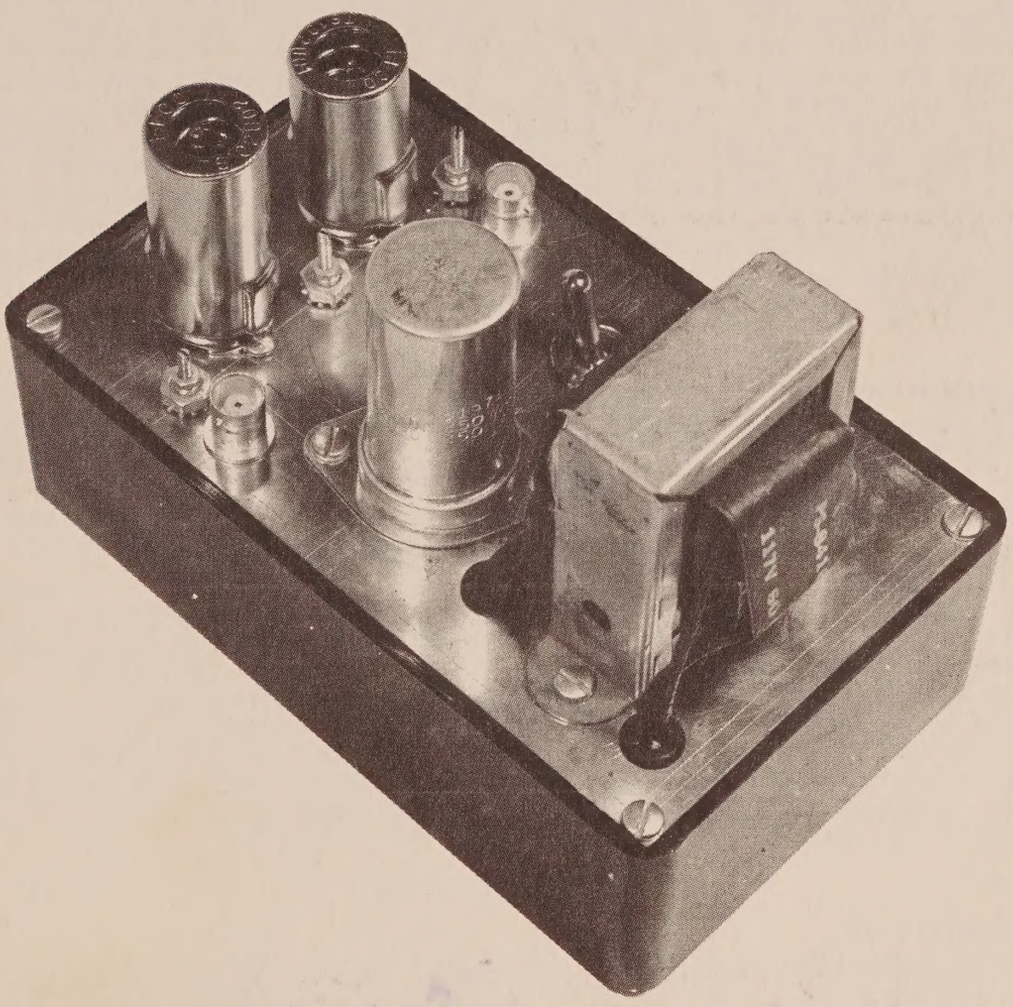
VHFER

50 MC. AND UP

LEARN BY DOING

Volume 3, No. 11 November 1965



I.F. NOISE BLANKER

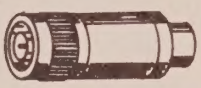
NEW FIRM! NEW PRODUCTS!

WIDE BAND AMPLIFIER

Modular, two transistor, silicon, wide band amplifier for preamplifier and general lab service are designed for use in 50 ohm coax systems. Frequency response is within one db from 10 to 250 megacycles. Gain over this bandwidth is guaranteed to be 10 db minimum. Typical noise figure is less than 5 db at 200 megacycles. Modules may be cascaded for increased gain without instability. Maximum input voltage for linear operation is 500 millivolts peak-to-peak. Model WB-1I is internally powered by two 9 volt batteries (supplied) and model WB-1E may be powered from an external source (not supplied). The amplifiers are housed in 4"x2"x15/8" minibox, grey hammertone enameled. Connectors: N, BNC, UHF or RF Phono. Price: $20.50 for either model, postpaid.*

RECEIVER PROTECTORS

Why buy protection? Semiconductors utilized in preamplifiers and converters can be severly damaged by leakage of transmitter power through inadequate antenna transfer relays. By placing a receiver protector between the relay and the protected unit this damage can be averted. Two model are offered: the RP-1 covering from 3 to 54 megacycles with better than 70 db isolation (also doubles as an in-line T/R switch with transmitters of less than 25 watts output), and the RP-2 for low noise VHF-UHF use with better than 40 db isolation from 50 to 450 megacycles. Neither needs tuning or creates harmonics which can cause TVI. Power for operation may be derived from transmitter or receiver. The RP-1 is contained in a 23/4"x 21/8"x15/8" minibox and the RP-2 in a 10"x2"x15/8" minibox; both are grey hammertone enameled. Connectors: N, BNC, UHF or RF Phono. Price: RP-1 $10.95, RP-2 $12.95. More information is available in brochure RP-1,2 free for the asking.*



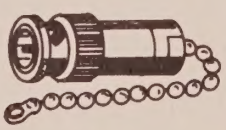
LP-1NM

LP-1NF

MP-1NM

PRECISION COAXIAL TERMINATIONS

Two series of precision, 50 ohm, coaxial terminations are offered. The LP-1 series are capable of dissipating 1 watt and are useful for terminating test pieces, noise generators, directional couplers, and may be used for standards in VSWR bridges. VSWR of LP-1 series terminations is less than 1.05 from d-c to 1300 megacycles. The MP-1 series are designed for medium power; up to 12 watts continuous in 50 ohm coax without heatsink, and up to 25 watts with suitable heatsink. VSWR of MP-1 series terminations is less than 1.10 from d-c to 1300 megacycles. Connectors: type N only. To order suffix model number with M or F to indicate male or female; eg. LP-1NF. Price: LP-1 series $12.00 each, MP-1 series $22.50 each, both postpaid.* Ask for brochure PTC for more information.



BNC TERMINATIONS

Consist of a one-half watt, 5% carbon resistor enclosed in a carefully machined housing which is silver plated to ensure good RF conductivity. They are supplied with a 75 ohm resistor installed and a 51 ohm resistor to replace it for use in 50 ohm systems. The chain is 5½" in length. Brand new surplus. $1.75 each, postpaid.*

SILVER PLATED WIRE AND TUBING

Of pure copper, plated with 0.5 mil of high conductivity silver, they offer low loss for critical tuned circuits in converters, pre-amplifiers, transmitters,etc. Sizes are #16, 14, 12, and 1/8" OD tubing. Maximum length in one piece is 25 feet. Price for any size is 40¢ per foot. Minimum order $2.00.*

* Maryland residents include 3% state sales tax with order.

Radiation Devices Co.

PO Box 8450 Baltimore, Md. 21234

Word as of Dec. 3 is that the Titan missile carrying Oscar IV is still on the revised schedule of Dec. 21. That is the earliest date, it may be later. Output frequency is 431.950 by last word here. 3 to 3.3. watts output. Receiver noise figure 2.8 d.b. You may have to elevate your antenna to 50 or 60 degrees or more to be able to track. Height is about 18,200 nautical miles.

FANTASTIC METEOR SHOWER

Leonids was really hot Nov. 16th K7ZIR called CQ and had four answers from four states on two. The contact that resulted from the CQ was in Montana. His neighbor W7UAB (Ore.) tail ended that QSO and made it also. ZIR worked 4 states in one morning. Others had good results too. Here's a sample of how things went:

K5WXZ	Texas	WA2FGK (N.J.), W4WNH (Ky.), W4VHH (N.C.), K7ICW (Nev.) W7JRG (Mont) and W8BKI (W. Va.)
W5UGO	Okla.	23 states heard on 2, 5 new ones worked. W1AZK (N.H.), WA2FGK (N.J.) on a CQ! , K7ICW (Nev.) in less than 1 min. of sked time, W7MFP (Utah), K7NII (Ariz.)
W6GDO	Calif.	WØEYE (Colo.), and WØMOX (Colo.)
K6GCD	S. Calif.	W7MFP (Utah), W7JRG (Mont.), WØEYE (Colo.) K7ZIR (Ore.)
K6HAA	S. Calif.	K7ZIR (Ore), WØEYE (Colo.)
K7ZIR	Ore.	K5TQP (N.M.), WØEYE (Colo.), K6HAA (So. Cal.) & K6GCD, W7JRG (Mont.)
W7UAB	Ore.	WØEYE (Colo.), K7NII (Ariz.), K7ICW (Nev.), W7JRG (Mont.) W7MFP (Utah)
W7LHL	Wash.	K7NII (Ariz.)
K7ICW	Nev.	WØENC (S. Dak.), K5WXZ (Tex.), W7UAB (Ore.), W7JRG (Mont.) W5UGO (Okla.)
W7MFP	Utah	WB6KAP (S.F. Area), K6GCD (So. Cal.), W7OUE (Ariz), W5UGO (Okla.), W7UAB (Ore.)
WØYMG	Kans.	K5TQP (N.M.)
W9WDD	Ill.	W1JSM (Mass.), W7PUA/2, W7JRG (Mont.), K7NII (Ariz.)

Pretty impressive for one shower. Most contacts were made on the 16th, a few on the 17th. Many schedules out west started about midnight. Don't get the wrong idea. This was a very, very exceptional shower. Supposedly with this one it happens so good only every 33 years. One astronomer we heard from said it may happen again next year. Be ready.

VHF NUT NET

There is a net on the appliance operators' band (about 3810 Kc.) every Sunday at about 9 pm PST. This collection of VHF addicts manages to exchange considerable information on skeds, new transistors, good and bum articles, select surplus and other vhf tidbits. It is strictly informal (a synonym for disorganized), lower sideband, and includes stations in Oregon, Calif., Utah, Ariz., Nevada., Colo. and Kansas. Sometimes it isn't worth wasting time on. Yet other times its pretty good. If you have high power on VHF and are a DX enthusiast, give a listen. If you are technically competent and have something to contribute, you're invited to check in. You'll hear calls such as K7AAD, K6GCD, WØEYE, W6GDO, W6NLZ, WB6KAP, K6KV and numerous others active in VHF. When propagation is right the east coast can check in and usually the midwest can. It is a problem to recognize the net. It is usually within 5 kc. either side of 3810. K7AAD

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AN I.F. NOISE CLIPPER

By Tom Curran, W7UAB*

Many articles have been written about methods of detecting weak signals in the noise. Some of these work fairly well and others were just somebody's wild idea that was never actually made to work. Improved reception through noise always costs something in the way of performance. This method is no exception to this rule. Since I didn't do the original design on this circuit I probably don't know as much about it as the designer, but I have built it and used it to good advantage. I think I can be objective about it. It took me two hours to build and a few dollars in junk box parts.

The problem I had was trying to copy very weak 2-meter tropo signals from the San Francisco area (WB6KAP) when the Fords go by. Fords seem worse than others about ignition noise. The solution came through WØ EYE who sent me Mel Baer's circuit (W6WSQ).

The basic difficulty here is the inability of the communications receiver to handle impulse noise, such as that from spark discharges radiated from automobiles and arcing or corona from power lines. A spark discharge causes an electromagnetic radiation with a very fast rise time. The duration of the discharges is quite short, but the intensity is so high that it excites the tuned circuits of the converter much more than the signal does. Once the input tuned circuit is excited the rest of the system responds, amplifying and lengthening the pulse. Most of the lengthening occurs in the selective (high Q) circuits of the receiver I.F. Though the initial pulse wave may have lasted only a fraction of a microsecond, the wave train that results from it may last a millisecond or more. When this wave train is rectified at the I.F. output and amplified, the pulse can be heard.

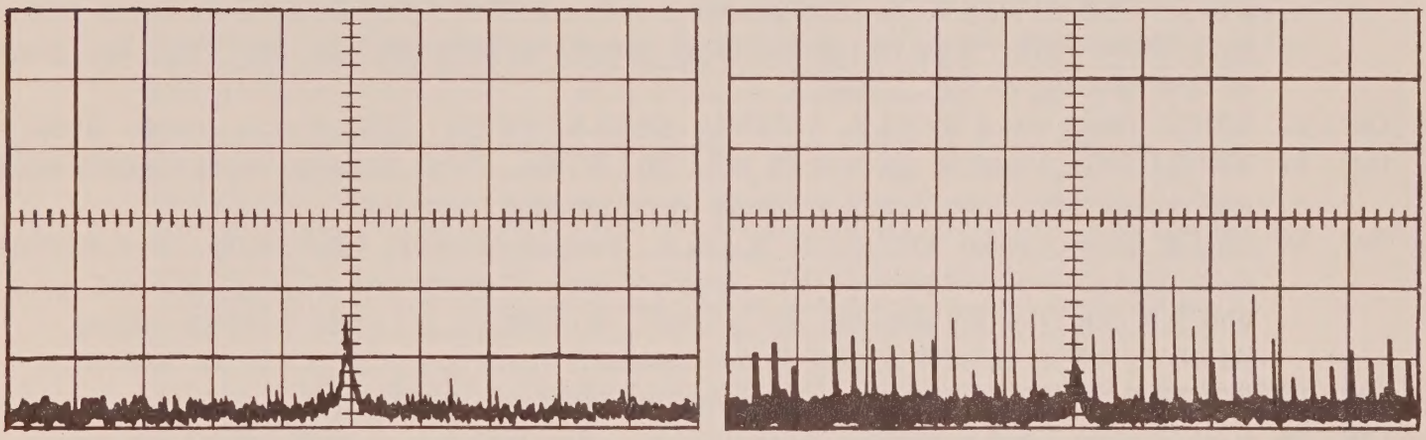
It would be nice if we could clip these noise pulses at the input to the preamp. or converter, but diodes don't start conducting at fractions of a microvolt of forward bias. A pulse or signal has to be quite a few millivolts high for the diodes to work right. So the output of the converter must be amplified and that is what the circuit to be shown does. At the output of this amplifier the pulses can be clipped to approximately the same level as the signal, even though they had a thousand times more peak amplitude than the signal. When all the garbage coming through the I.F. has been "equalized", the frequency selective circuits can operate to give prominence to the desired signal. The dramatic difference is shown in the photographs of the CRT on a spectrum analyzer (next page.)

As to how well it works, the strong impulse signals like those shown I can't hear at all with the clipper in. Very weak impulse noise I can still hear, but it isn't so objectionable. It blends in with the background noise but doesn't dominate. The reason for the better performance on the higher amplitude impulses is that the diodes can work more effectively on the larger signals. You might wonder if there is any deterioration in weak signal performance when there is no impulse noise. I have made several tests with weak signals under quiet conditions and find the readability to be the same whether the I.F. clipper is used or not. This is because on weak signals the diodes aren't clipping at all. My I.F. is 14 Mc.

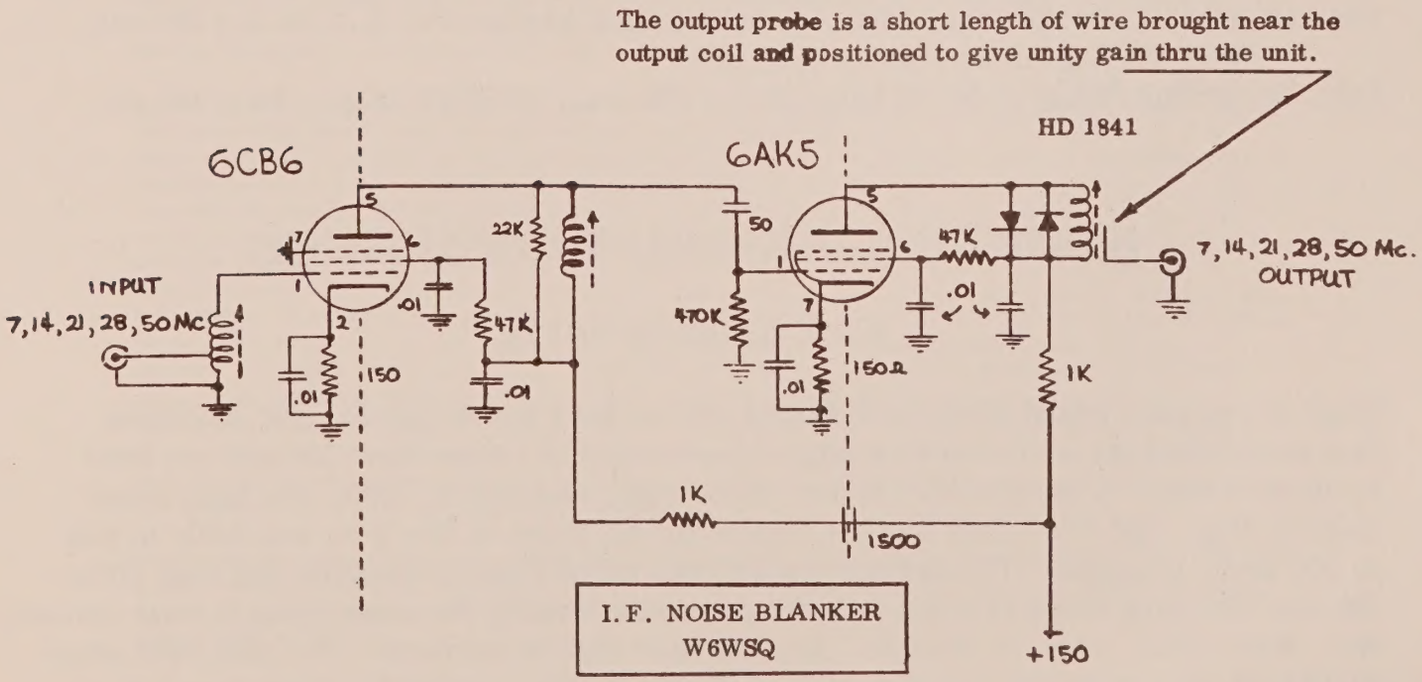
The circuit is a 2-stage r.f. amplifier with a pair of very fast back-to-back diodes across the output. The diodes used by W6WSQ were not available to us, but the Hughes HD 1841 worked very well. These are listed in Newark or Allied catalogs at 88¢ each. Don't use just any germanium diode or you won't get the results you should.

*7965 S.W. 87th Portland, Ore.

Here is the price you must pay for this improved reception through impulse noise. If there are other locals on the band, forget it. Their signals will drive the amplifier and diodes into saturation and you are out of business. Everything goes quiet. I limit use to early morning and late evening skeds when the locals aren't on. In theory, if you use a very selective filter at any place ahead of the clipping diodes you can get by with some local activity provided it isn't too close to the frequency you're listening to and not too strong. I use a cavity filter ahead of the converter and this helps quite a bit except for stations 100 kc. or so away. K7ZIR also built one of these clippers and finds it helps considerably to reduce power leak noise.



A visual comparison of impulse noise with and without the clipper. The signal is in the center. The gain ahead of the spectrum analyzer is approximately the same in both displays.



OPEN BANDS

by Marilyn Wiseman, K8ALO

Band conditions have been excellent this past month. Distances worked were well above the average. Even though old man winter is just around the corner this doesn't mean openings can't occur, so keep your ears open. You might be surprised. Looking forward to your report next month. My address: Box 103, Petersburg, Ohio 44454.

144 Mc.

Oct. 3 K7ICW (Las Vegas) wrkd W6NLZ, K6IBY, K6TSK, W6DNG tropo 0810-0835.
Oct. 9 W4CKB (Fla.) wrkd K2HLA (N.Y.) c.w. meteor showers. K5WXZ (Garland, Tex) hrd W4CKB wrking N.Y. Signals were 599. K7ICW wrkd WØENC in Rapid City, S.D. 2000-2100. The two meter band opened up between Fla. and Tex. La. joined in this opening on Oct. 10th.
Oct. 10 K7ICW (Nev) wrkd W6NLZ, W6YVO, K6HAA, K6IBY, K6GCD c.w. tropo 0810.
Oct. 11 W4CKB (Fla.) had 36 QSOs with W5, K5, WA5s. Bev. reports most signals were well above S9. Two Texas stations were running Two'ers.
Oct. 13 K7ICW (Nev.) wrkd WØENC (S.D.) c.w. meteor showers 0600-0700. Hrd K5HMN Aero Mobile wrk W7GNP on A3, area between Phoenix and Tucson, 300 mi. plus. W4CKB (Fla.) wrkd W4NHW (Ky.) 0600. K1ABR (R.I.) wrkd W8WEN (Ohio), K3OBU, W3HC (Del) W3MBN (Pa.). K1ABR reports condx gud to SW and West.
Oct. 19 K7ICW wrkd WØENC (S.D.) c.w. meteor showers 0530-0700.
Oct. 24 K7ICW (Nev.) wrkd K6IBY, K6GCD c.w., Hrd W6NLZ, K7ZIR (ore.) 825 mi, K6GCD wrking W7UAB (ore.)

432 Mc.

Oct. 9 W4GJO (Sarasota, Fla.) wrkd W5LDV, K5LLL (Houston) 825 mi, W5AJG (Dallas) 970 mi., W5LUU (San Antonio) 1025 mi. (Is that a record?)
Oct. 10 W4GJO (Fla.) wrkd W5FSC, W5LDV, K5LLL (Houston) 825 mi, K5AOK (Victoria) 930 mi., W5AJG (Dallas) 970 mi., W5LUU (San Antonio) 1025 mi.
Oct. 11 W4GJO (Fla.) wrkd W5AJG (Dallas) 970 mi., hrd W5HPT (Ft. Worth) 990 mi.
Oct. 18 W8YIO (Manchester, Mich.) wrkd W2MDE (Hicksville, L.I. N.Y.) 560 mi, W7PAU/2 (Denville, N.J.) 475 mi.
Oct. 19 W8YIO (Mich) wrkd W2MDE (N.Y.) 560 mi., W3MMV (York, Pa.) 405 mi.

BACK ISSUES OF VHFER

Many of you have asked about back issues and we have had to ignore your inquiries because of the high cost of answering. Also we couldn't send any. But now we have re-printed some of the earlier issues--those since January of 1965. We have some August, Sept. and November of 1964 issues and all those of this year available to you at 20¢ each, postpaid. The earlier issues have more 2 meter articles and very little 432 but also have some articles on test equipment, finding the weak spots in your station, etc. Send check, cash or stamps. Any not used will be refunded. We still have some bundles of 12 6 up magazines available at $2 per bundle, postpaid. These are not continuous, just what we have. A good value. We also have results of an antenna contest held in the S.F. Bay area a couple of years ago available for a self-addressed, stamped envelope. 432 antennas only--home made and commercial.

Moonbounce Newsletter

by Victor A. Michael, W3SDZ
Box 345, Milton, Penna.

The only active moonbounce work to report at this writing took place October 16th and 17th. Tests were conducted from K2MWA/2 at the Crawford Hill site of Bell Labs. The antenna was a commercial sixty foot dish that develops 35.5 db gain — feedline loss was 1.5 db — receiver noise figure was 2 db (paramp) and transmitter output was 350 watts. With this setup they were receiving their own echoes some six to eight db above the noise level in a 300 cycle i.f. bandpass. (This figure may not sound like much, but note I said above noise level. Above threshold they were in excess of 20 db. I will discuss this in a later column. They worked W1BU with W1HIV operating. They heard Q5 signals from W9HGE and our station W3SDZ. W9HGE and I heard K2MWA, but felt the signal was not of sufficient level to warrant communication. My signal was also heard by Pat at W1BU. Both W9HGE and myself were using our transistor preamps instead of our paramps. In this case the paramps probably would have made the difference in a contact. In addition, we have carefully measured the gain of my dish, and found it to be down 3 db from it's theoretical possibilities. (This problem will also be discussed in more detail.) All tests by the way were on a frequency of 432.000. Announcement of the test was sent to all on my mailing list of active stations.

Since I've become involved in Moonbounce experiments, I receive almost daily letters telling me that the writer is "ready to make some moonbounce tests with you O. M.". Then, the letter goes on to say, "the antenna here is a brand X yagi or a six foot dish etc." I don't for a minute mean to berate these writers —I'm sure they are sincere. What is hard to understand is how this optimistic view of moonbouncing could become so widespread. Perhaps the KP4BPZ tests have something to do with this. The thing to remember is that KP4BPZ had 58 db of antenna gain on one end of the path. — W1BU has copied KP4BPZ some forty db out of the noise in a sharp filter with a 29 db antenna. This all means that you should be able to hear the KP4BPZ signal with a dipole antenna — in fact I know two people that did just that during the last test. In practice this means — if you are going to get signals back and forth (or hear your own echoes) on 432, you must have an antenna with at least half the gain of Arecibo. If your antenna gain falls below 29 db, you only hear your echoes on a marginal basis — when it falls below 26 db, you DON'T hear your echoes.

Let me make something very clear at this point. There are those who would lead you to believe you might be able to work moonbounce with a small antenna and meager equipment if you will but keep endless schedules. I can agree that after you listen to the noise out of a narrow audio filter for a long period of time — you will indeed think you are hearing signals that are not there. I don't believe in black magic. The old saw about the bumble bee not being able to fly — I don't buy either. It is much more than mathematics that proves out the fact of the path loss involved for successful moonbounce communication. The government, and countless private labs have conducted well documented practical studies of the pathloss on various frequency bands adjacent to most of the ham bands. In every case the experimental results were close to theory. I bring this point up only to save you time — you must build a large array if you intend to work moonbounce below 1296. Above 1296, the antenna size goes down, but the equipment problem gets more difficult for amateurs.

The routes to making (or acquiring) a large antenna are as endless as the imagination of the amateur mind. There are of course some considerations to deal with. These will vary from amateur to amateur. What I propose to do in the next several columns is examine the various antenna systems that can be made to develop the necessary gain for a successful moonbounce effort. In each case the antenna described can be built by an amateur. It will take a lot of work, but there is no easy road to hearing your own echoes.

On two meters to 432 the colinear antenna or an array of small yagi antennas is a practical approach. When you examine gain for antenna size, you will find that for antenna gain less than 20 db — a colinear array can't be matched. An array of this type is about 100% efficient for its aperture area. A dish antenna by contrast is only 50% efficient for its aperture area. Now, it would be easy to draw the wrong conclusion from this statement. Why not stay with the colinear array and forget dishes. What happens is simply this — as you go for more gain you reach a point where gain starts to taper off above twenty db. When you get to thirty db of gain, phasing line losses and out of phase components bring the efficiency below fifty percent. From 30 to 70 db gain, the reflector type antenna takes over. The interesting thing is that it's efficiency gets better above 15 db gain and remains constant around 50% to 70 db. I don't know of any antenna that does much above 70 db. What happens is a variety of problems limit the maximum gain attainable with any antenna system. The choice of array you chose is up to the individual. The expanded extended colinear described in the Frank Jones VHF hand book is a good start. I used a conventional colinear type array with 256 elements that produced my own echoes on occasion, and an exchange of signals with Sam operating W1BU. We are reasonably sure that the antenna was developing it's theoretical gain of 26 db. My equipment was not as refined during the experiments with that antenna, but it is still standing and we might make some more measurements on the antenna before it is dismantled.

K2CBA has developed a small yagi antenna and incorporated it into a large stacked array that works very well. It hears sun noise with a ten foot square aperture. It would appear that four of these arrays slightly bigger than 20 x 20 might be capable of hearing echoes on 432. If you are interested in this array, I suggest you write to Jud for details.

I have run out of space a paragraph or two back, so I must close things out. Next month we'll have complete details of how to design and build a parabolic antenna that will get you echoes on 432 and up. In months to come an antenna that is 75% efficient for it's aperture size and a steering system for it that requires only half the amount of movement for a given amount of scanning. If you're doing anything in the moonbounce field, let us know about what you're doing.

A VHF-UHF SIGNAL SOURCE

by Louis Hutton, K7YZZ*

Recent articles in VHF'er and 73 Magazine have described both battery and conventional powered marker signal generators. This unit is a battery operated solid state signal source with RF output on 144.150 mc, 432.450 mc, and 1297.3 mc. It is used by the author as a signal generator to aid in adjustment of the "tin can converter."

The transistorized oscillator-tripler is built on a copper clad phenolic circuit board 4-1/2" x 2-1/2". An aluminum chassis 4-1/2" x 2-1/2" x 1" forms a cabinet for the oscillator-tripler with the phenolic circuit board acting as the cover. The output of the tripler is fed to a 432 mc half wave trough line, through a 1N82 diode. This trough is made of 18 gauge copper with a 1/4" copper gas line center conductor. The trough is 1" x 1" x 7". The 1N-82 is tapped up on the center conductor 1-1/4". The center of the line is tuned with a home made tuning capacitor made from two copper plates 3/4" in diameter. One plate is soldered to the line, the other, on the end of a 6-32 x 3/4" round head machine screw. A 6-32 brass nut is soldered to the trough to provide threads for the adjustment screw. The output link of the 432 mc trough line is brought out 1-1/2" from the end of the line opposite from the crystal diode end.

The 1296 mc trough line is 1" x 1" x 3-5/8" with the 1N-82 diode tapped up 5/8" from one end of the 1296 mc line, and up 2" on the 432 mc line. The output line is brought out 3/4" from the other end of the line. The tuning capacitor construction is the same for the 1296 mc trough line as was for the 432 mc line.

A grid dipper operating in the "diode" mode or other wave-meter is useful in tuning up the oscillator-tripler.

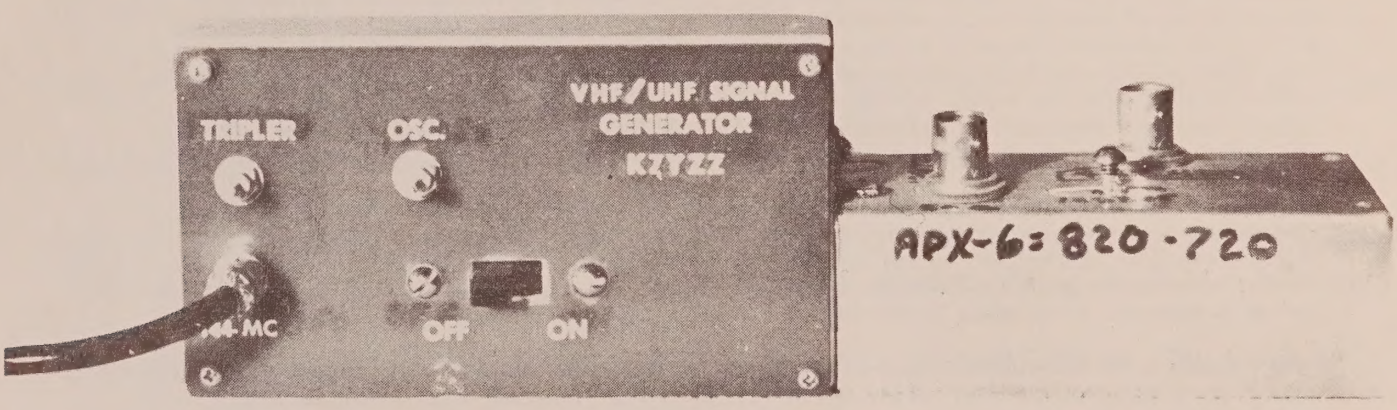


Figure 1

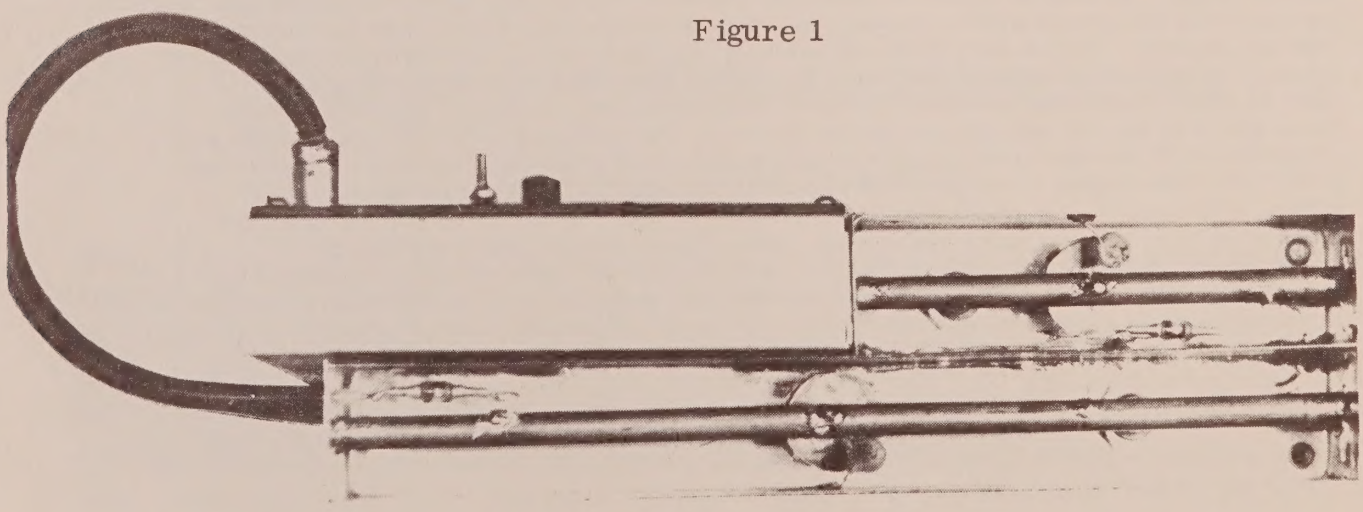


Figure 2

* 12235 S. E. 62nd
Bellevue, Washington 98004

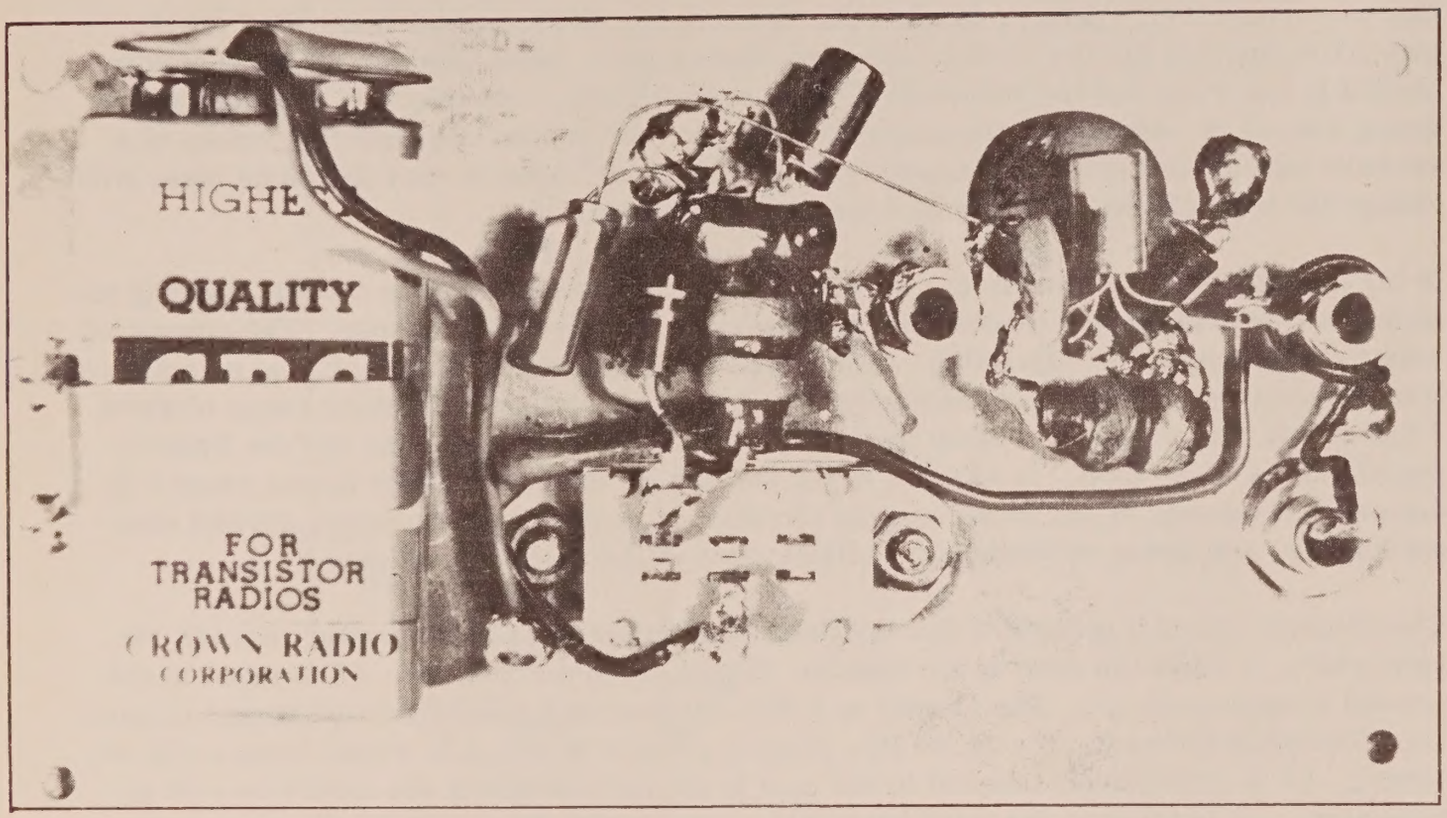
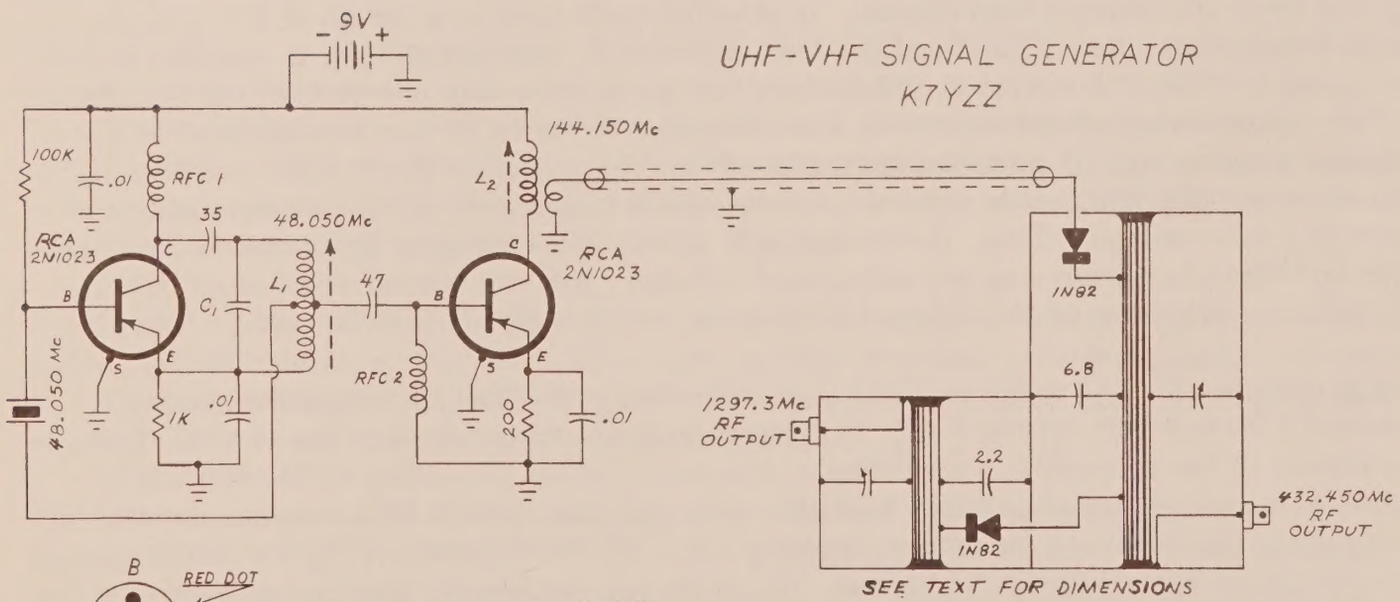


Figure 3



RFC 1 6.2 microhenry Miller #4610
RFC 2 1.5 microhenry Miller #4604
L_1 13 turns #24 enameled wire on 1/4" slug-tuned form. Tapped 7 turns from emitter end.
C_1 5 pf
L_2 5 turns #20 enameled wire on 1/4" diam. slug-tuned form. 2 turn link over the cold end.

Figure 4

BUTLER CRYSTAL OSCILLATOR WITH VARIABLE CAPACITANCE DIODE TUNING

by Paul M. Wilson, W4HHK/A4HHK

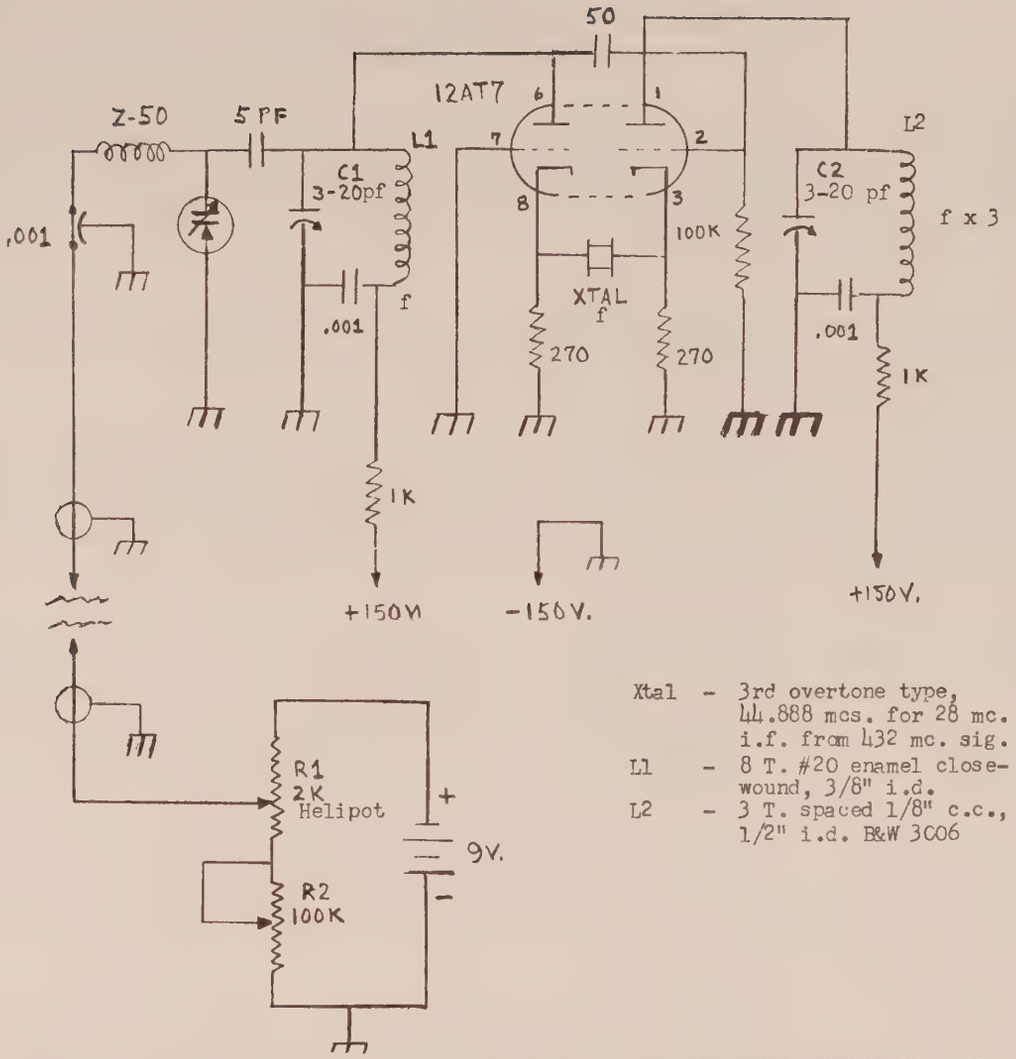
The communications receiver used as the tuneable i.f. for a crystal-controlled v.h.f. converter does not always provide adequate bandspread. Much bandspread is especially needed in ssb work and the reception of weak c.w. signals. An easy way to obtain a slow tuning rate is by varying the frequency of the converter crystal oscillator by means of a variable capacitance diode. A multi-turn potentiometer, used to vary the diode bias, will change the crystal frequency for fine tuning of the signal.

In the circuit shown, the diode is connected across the oscillator plate circuit, making use of the fact that tuning this circuit will pull the overtone crystal frequency. The amount of tuning or bandspread is adjustable, within limits, by the setting of the limiting potentiometer, R2. The tuning control is potentiometer R1, a ten-turn Helipot. A tuning range of about 3 kcs at 432 Mc. is achieved when the tuning potentiometer is 2 K ohms and the limiting resistance is 82 K ohms. In addition to the ratio of R2 to R1, the exact tuning range will depend on a number of variables such as circuit L/C ratio, stray capacity, crystal characteristics, and order of frequency multiplication of the crystal frequency.

The diagram shows a portion of the oscillator/multiplier used by the writer in a 432 Mc. converter. A 12AT7 is used in the familiar Butler oscillator circuit. L1 is tuned to the crystal frequency by C1. The crystal is a 3rd overtone unit made by International Crystal Co. The ninth harmonic of a 44.88 Mc. crystal gives a 28 Mc. i.f. signal from a 432 Mc. signal. L1 is capacitively coupled to the grid of the second half of the 12AT7 by a 50 pf. capacitor. L2 is tuned to the third harmonic of the crystal frequency by C2.

The variable capacitance diode, a Varicap V-12, is connected in parallel with C1. This diode is made by Pacific Semiconductors. It has a range of 5.2-31 pf. and a maximum working voltage of 25 volts. Capacitance at 4 volts d.c. is 12 pf. The cathode end, marked with a band, connects to the plus terminal of the battery circuit. a 5 pf. silvered mica capacitor serves as blocking condenser to keep 12AT7 plate voltage off the diode. An Ohmite Z-50 r.f. choke and a .001 mfd. feedthrough capacitor are used to isolate the tuned circuit from the external bias circuit. A shielded cable such as a length of RG-58 connects between the control point and the Varicap circuit. The 2 K Helipot is mounted at the operating position. A matching dial enables the operator to read one part in one thousand for ten turns of the potentiometer. A few kilocycles of tuning by this arrangement is extremely slow tuning. In adjusting the value of limiting resistor, R2, a relatively low value should be avoided in order to minimize battery drain. A battery is the simplest means of providing bias voltage. True, the voltage will slowly decrease over a period of weeks, but hum and regulation problems are eliminated. Battery life will almost equal shelf life if the total resistance is on the order of 82 K ohms (current drain about 0.1 ma.)

Initial adjustment is as follows: Set R 1 at mid-range and R2 at maximum resistance. Connect a fresh 9 volt battery to the Varicap circuit and apply power to the 12AT7. If the remainder of the converter is operating at this time, adjust the tuning of C1 until a test signal of known frequency is tuned in at the approximately correct i.f. frequency on the communications receiver serving as tuneable i.f. Check the range of the Varicap tuning by varying the resistance of the Helipot, R1, from one extreme to the other and note the amount of frequency the i.f. signal is shifted. Adjust the limiting potentiometer, R 2, until the desired range is obtained. The writer has made no attempt to achieve linear tuning or to make use of this circuit in an automatic frequency control system, but such is worth considering. This circuit gives the slow tuning rate desired, and has worked very well. It was in use during the July 3, 1965 moonbounce test when the writer made a 432 Mc. contact with KP4BPZ. Helipots and dials are expensive when bought new, but are frequently available on the surplus market at reasonable prices. The Varicap diode retails for a few dollars. End.



BUTLER CRYSTAL OSCILLATOR WITH VARIABLE - CAPACITANCE - DIODE TUNING
by Paul M. Wilson, W4HHK

432 REPORT
by Ansel Gridley, W4GJO

The following is taken from a letter to VHFER: WA4BYR, W4UWH and I are all on 432 nightly, using SSB and CW and from 300-500 watts output. Lou has a 32 el. long-long Yagi which performs as good or better than his 64 el. extended-expanded colinear. So far as I know, that's the best Yagi performance anywhere. Although this is theoretically sound, it's not easy to get a Yagi to perform this way at 432. Lou used this Yagi successfully twice in EME contacts on SSB with Arecibo.

In this part of the country, it appears that our reliable range on 432 is in excess of 300 miles, but unfortunately we have few stations in that area well-enough equipped to prove it. However, W4BCL in St. Simons Island, Ga. is about 300 miles and his 4X250 puts a signal in here every night on his skeds with W4UWH.

The boys from across the state, even with 2-5 watts out into good antennas, normally peak to S9 here nightly at from 150-200 miles and are solid AM copy. On normal nights there is much rapid QSB, but never into the noise. W4UWH at 66 miles can reduce his power in steps and can easily be copied on SSB at 400 microwatts! So you can see that 432 really works in these parts.

We had another Texas opening last week-end (W4GJO is in Fla.) with signals up to S9 plus 30, peaking best in mornings and evenings, but in virtually all day long. These 1000 mile signals are hard to believe. Too bad we don't have similar ducting frequently in other parts of the country. 432 would really be something to behold.

THE SAN JOSE ANTENNA CONTEST

by Fred Brown, W6HPH*

July fifth was a bright, sunny, pleasant day at the Santa Clara County Fair Grounds, scene of the 1965 Annual West Coast VHF Convention 432 and 1296 mc Antenna Measuring Contest. This contest was held coincident with and as a part of the San Jose A.R.R.L. National Convention.

Altogether, twenty 432 mc and nine 1296 mc antennas were tested. It was one of the biggest and most successful antenna contests so far held in the West.

Results weresimilarto previous antenna contests. The commercial antennas turned in their usual dismal performance, and as usual the winners were the large extended-expanded arrays. Of course, this is not so surprising since nearly all of the large arrays were of the extended-expanded type.

First place in both contests were won by the same entrant: Will Jensby, WA6BQO. Will won the 1296 contest with a 4-1/2 foot dish, which, not surprisingly, was the largest 1296 antenna. His 32 element extended-expanded bed-spring was only the second largest 432 antenna, however, being surpassed by one 64 element W6GD design that placed a near second in gain.

Other high-lights of the contest were a commercial antenna entered by K6HCP which had more gain off the back than off the front; and a large Rhombic entered by W6HPH which disintegrated during measurement.

Editor's Note: The 10-element Skybeam entered by K7AAD and the Telrex entered by K6KV were purchased expressly for the contest to show the standings of commercial beams under identical test situations. The Hy-Gain antenna entered by K6HCP was brought for the same purpose. This antenna had a slight modification (a tuning stub) and therefore was not exactly as the manufacturer had supplied it. However, in my opinion, the miserable performance is characteristic of an antenna not properly designed and has nothing to do with the stub. As I recall, both the Hy-Gain and Telrex had some forward gain at 420 Mc--but who works 420? No instructions came with the Telrex for use at 432. It would be a mistake, in my opinion, to treat these measurement data as accurate to laboratory standards. However, the numbers should be indicative of some of the problems and relative performance of antennas for 432. All antennas were terminated in an 8 or 10 d.b. coaxial pad and all were used to receive. The 432 source was a colinear with a tone-modulated signal. The reference dipole was made by WB6JZY especially for the contest. K7AAD.

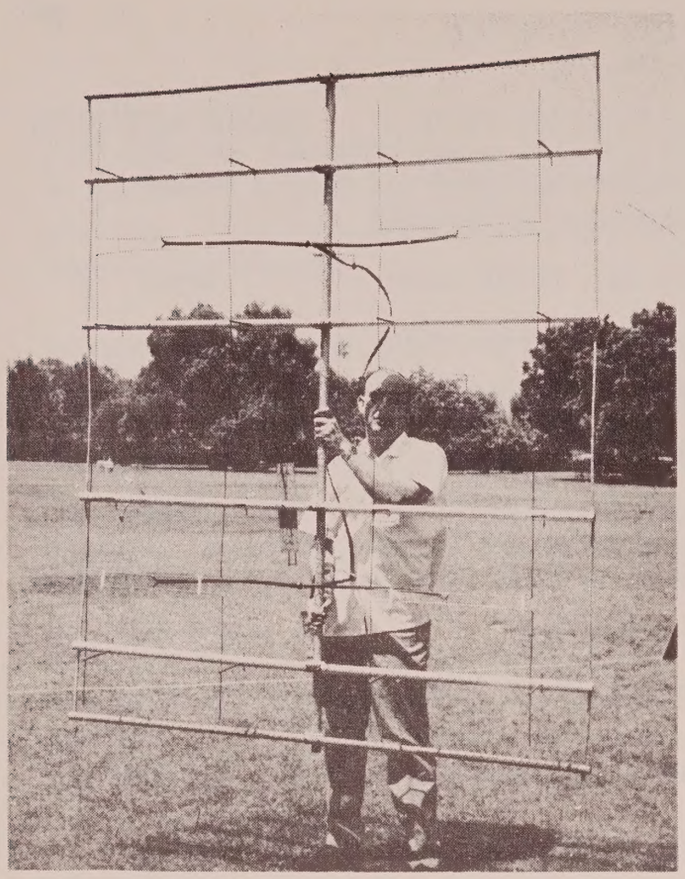
RESULTS: 1296 Mc.

ENTRANT	GAIN, DB/DIPOLE	ANTENNA TYPE	MANUFACTURER
WA6BQO	22.0	4-1/2 Foot Dish	Surplus
W6DFU	17.5	32 Ele. W6GD style	Home
WA6GYD	16.5	32 Ele. W6GD style	Home
K6HM	15.5	30^{o} Pyramidal Horn	Home
W6HPH	15.1	60" Yagi	Home
WA6MGZ	8.1	Oil Can	Shell Oil Co.
WA6BQO	8.0	Waveguide adapter	Surplus
W6HPH	7.7	Dipole and plane reflector (6db theoretical)	Home

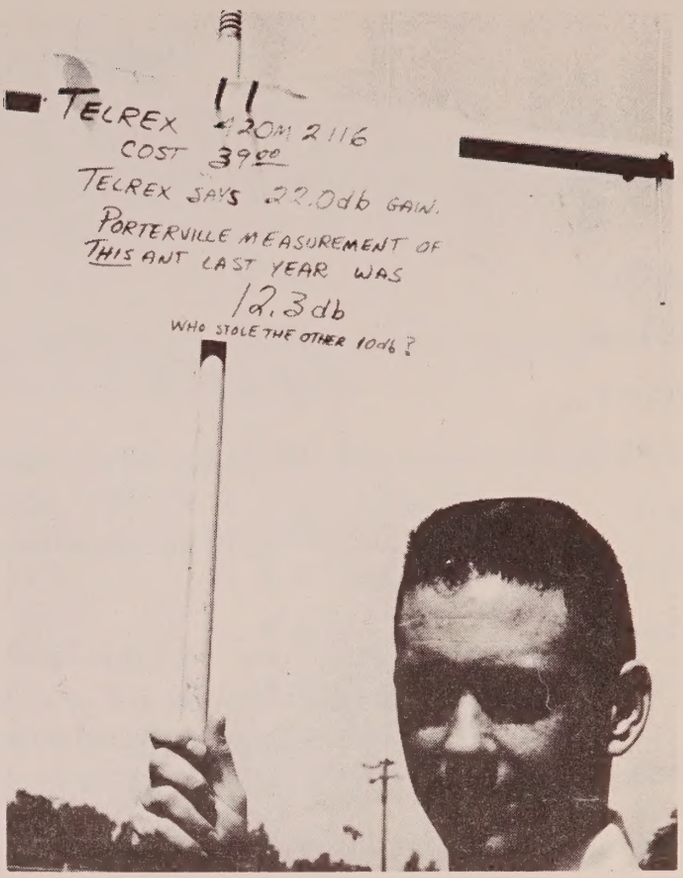
*Pine Cove
Idyllwild, California

RESULTS: 432 Mc.

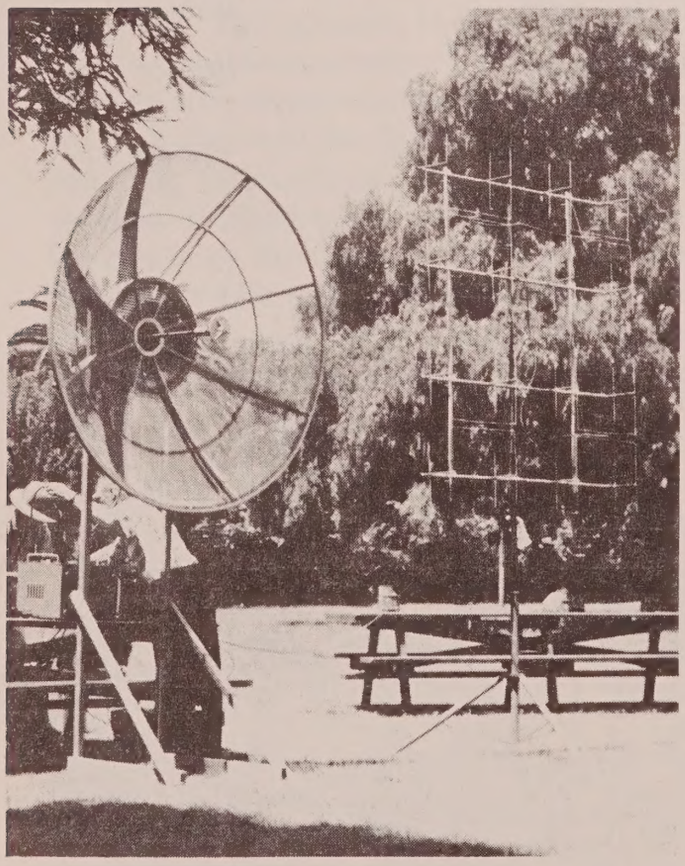
ENTRANT	GAIN, DB/DIPOLE	ANTENNA TYPE	MANUFACTURER
WA6BQO	18.6	32 Ele. extended-expanded bed-spring	Home
K6RIL	18.5	64 Ele. W6GD style	Home
W6VSV	18.2	32 Ele. W6GD style	Home
W6HPH	10.5	30 Foot Rhombic	Home
WA6VGR	10.2	20 Ele. J Slot	J Beam
K6JC	9.5	17 Ele. J Slot	Home
W6GDO	9.2	16 Foot Yagi	Telrex 420M2116
K7AAD	9.1	8 Foot Yagi	Gibson
WA6BAN	9.0	8 Ele. W6GD style	Home
K6HCP	9.0 off back 1.0 off front	13 Ele. Yagi	Hy-Gain
WA6QQI	9.0	10 Ft. Yagi	Home
K6SDZ	8.5	64 Ele. Broadside	Cush-Craft
K6IBY	8.2	20 Ele. J Slot	J Beam
K7AAD	7.5	10 Ele. Yagi	J Beam
W6IMX	7.2	16 Ele. Extended	Home
W6HPH	6.9	7 Ele. Yagi	Home
WA6KKK	5.0	Twin 13	Home
K6KV	-12 off front +6 at angle	15 Ele. Yagi	Telrex



Winner Will Jensby displays his 432 colinear with chicken wire screen reflector.



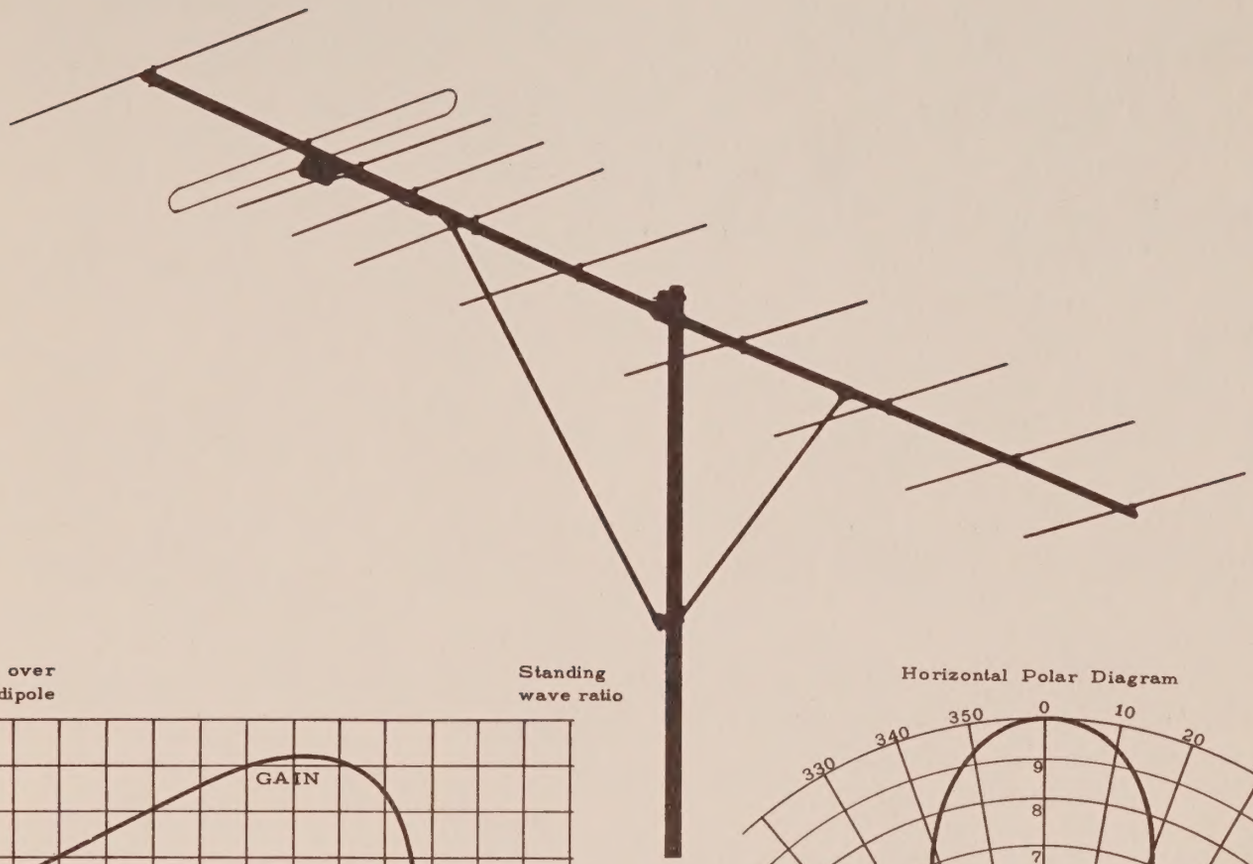
Jay O'Brien looks for the thief who stole the "other 10 db" from his long Telrex. The 10 db is the difference between claimed and measured gain.

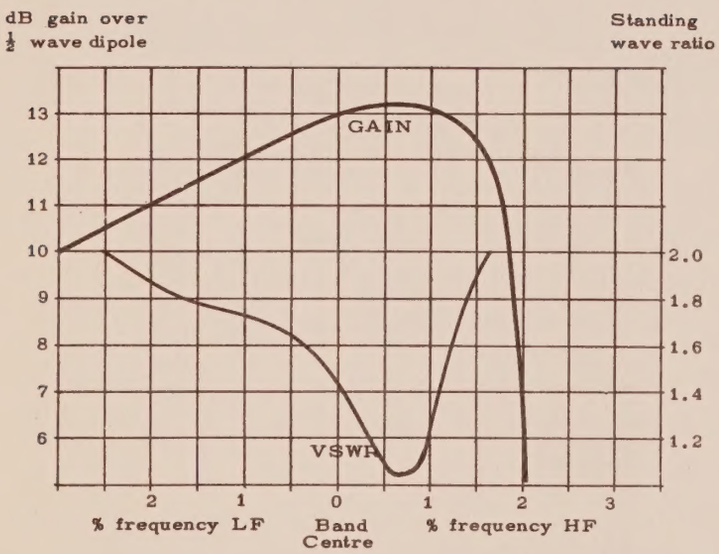


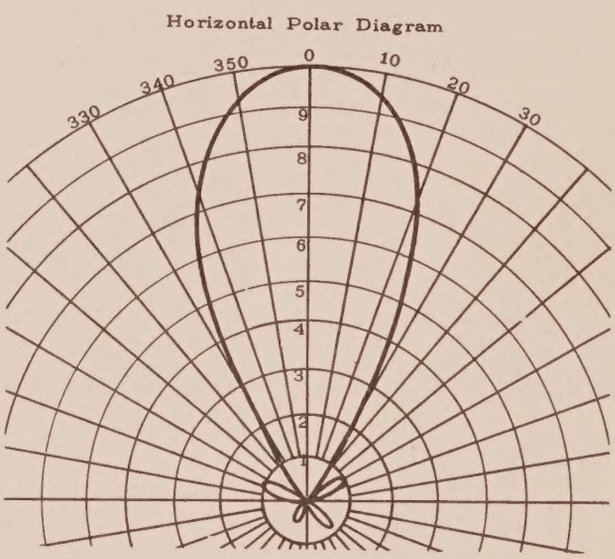
Transmitting setup. Dish for 1296 and colinear for 432.

Fred Brown peaks the signal with his yagi at the measuring line.

SKYBEAM







A PROVEN PERFORMER, this two meter SKYBEAM by J Beam Aerials, Ltd. of England. 13 db. gain over a dipole at 146 Mc., 15 db. over an isotropic radiator. Ruggedly built. Boom, elements and support rods of aluminum, 3 brackets of steel (plated). Available for feed with twin lead or coax. See the review in the May VHFER.

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